



# AIR HANDLING UNITS WITH HEAT RECOVERY VW, VS SERIES

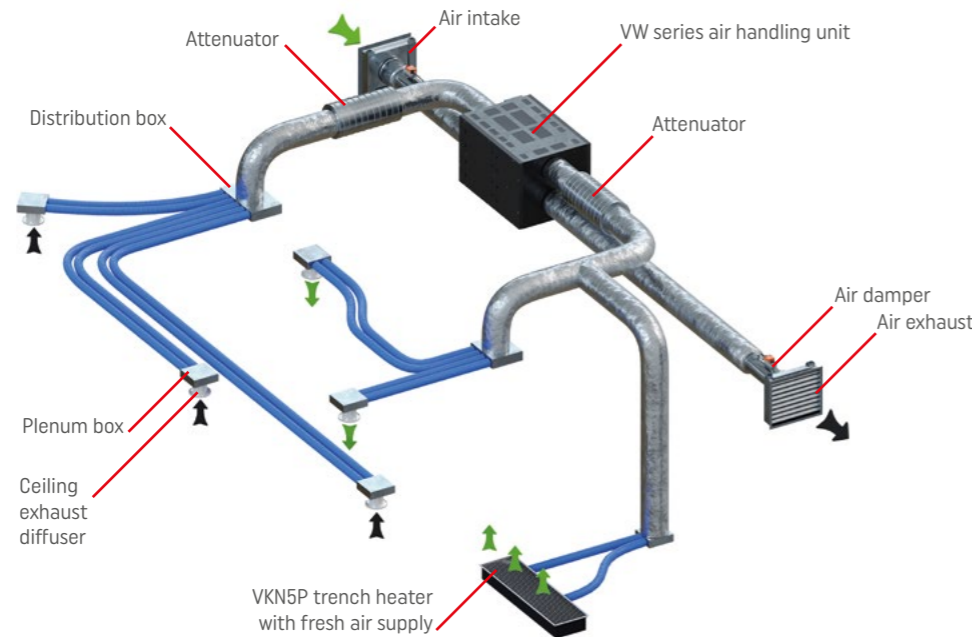


freshAIR+

TECHNICAL DATA  
04/2022

# FRESH AIR DISTRIBUTION SYSTEM

Traditional air exchange in rooms in a building with a mechanical ventilation system with heat recovery is carried out by supplying fresh air and exhausting used air through ceiling diffusers. In living rooms, ceiling supply diffusers can be replaced with VKN5P trench heaters or CVKP trench heating and cooling units with fresh air supply. The stream of treated air from the air handling unit is supplied directly to the heat exchanger, thanks to which the temperature of the supplied air can be locally adjusted to the needs of users.



In the construction of VKN5P trench heaters and CVKP trench heating and cooling units, which are part of the **freshAIR+** system, the treated air is supplied from the air handling unit, where it is subject to initial filtration. In order to optimize the air stream regulation, VKN5P trench heaters and CVKP trench heating and cooling units have a factory built-in CAV (Constant Air Volume) regulator, which enables quick and easy adjustment of the designed air stream. While the heaters ensure that the desired temperature is maintained in winter, the heating and cooling units provide the right temperature and an optimal microclimate in both summer and winter.

Smooth regulation of the fan operation with the 0-10V signal guarantees that the device operation is adjusted to the current demand of the room for heating or cooling. VKN5P trench heaters and CVKP trench heating and cooling units can also be equipped with pressure independent control valves (PICV) that precisely regulate the medium flow and pressure in the installation.

# HEAT RECOVERY THE FUTURE IN YOUR HOME

Buildings require ever lower indicators for the demand for non-renewable primary energy for heating, ventilation and domestic hot water. To meet these requirements, mechanical ventilation with heat recovery will become mandatory. Therefore, in the case of newly designed buildings, it is so important to plan a mechanical ventilation system just now.

The most important element of the ventilation system is an air handling unit that forces air exchange between the internal and external environment and enables heat recovery from the exhausted air.

A properly designed ventilation system:

- reduces heat loss for ventilation, i.e. the energy needed to heat the outside, cold air during winter,
- ensures high quality of indoor air, thanks to which allergens in the air (mites, bacteria, viruses) affecting the health of users will be eliminated,
- provides constant in time and conditions the amount of air supplied and exhausted from the room.

The **freshAIR+** air handling units of the VW series are ideal for use in the attic of single-family and multi-family buildings. On the other hand, the freshAIR + air handling units of the VS series are perfect for rooms with vertical ducts leading to the ventilation unit, as well as in boiler rooms and utility rooms with limited cubic capacity. Housing made of extruded polypropylene (EPP) with a thickness of 40 mm ensures optimal thermal and acoustic insulation. Compact air handling units are equipped with a two-stage filtration system, an optional heater or cooler and a temperature, hybrid or enthalpy exchanger. The standard CF (Constant Flow) system facilitates the adjustment of the installation and guarantees a constant air flow regardless of weather conditions or the degree of filter contamination.

The product was created as part of the research project „New generation recuperators - development of a group of innovative products” under the Smart Growth Operational Program 2014-2020, financed by the National Center for Research and Development in Poland. Tests of the heating power of water heaters and coolers were carried out at Laboratorium of the VERANO GLOBAL Sp. z o.o., measurement of the temperature efficiency of air handling units and the effectiveness of microbiological disinfection at the Laboratory of the Indoor and Outdoor Air Quality Department of the Lublin University of Technology, while the acoustic power level at the accredited GRYFIT LAB laboratory.



# ONE CASING MANY POSSIBILITIES



## Temperature and moisture recovery\*

The available models of the VW and VS series differ in the heat recovery method used. The heat exchanger is the central element of the air handling unit, which enables heat recovery from the exhaust air to the supply air. Standardly used temperature exchangers (VWT, VST units) allow for the recovery of sensible heat, which depends solely on the temperature difference between the balanced air streams.

\* Hybrid (VWH, VSH units) and enthalpy exchangers (VWE, VSE units), thanks to a special membrane, also allow for moisture recovery. Hybrid and enthalpy exchangers differ in the degree of moisture recovery from the exhausted air.

Moisture recovery has double benefits:

- Total heat recovery (including energy contained in water vapor),
- Humidification of the air supplied to rooms in winter.

Blowing dry air into the rooms reduces comfort (coughing, dry throat, irritation of the eyes) and causes dust to rise in the rooms.

AHU model	VWT	VWH	VWE
Exchanger type	Temperature	Hybrid	Enthalpy
Temperature efficiency of heat recovery [%]			
• for the nominal air stream	89%*	86%*	81%*
• for the minimum air stream	93%*	92%*	89%*
Moisture recovery	No	Yes	Yes
Air stream [m³/h]			
• maximum	450	450	330
• nominal	315	315	230
• minimal	90	90	90

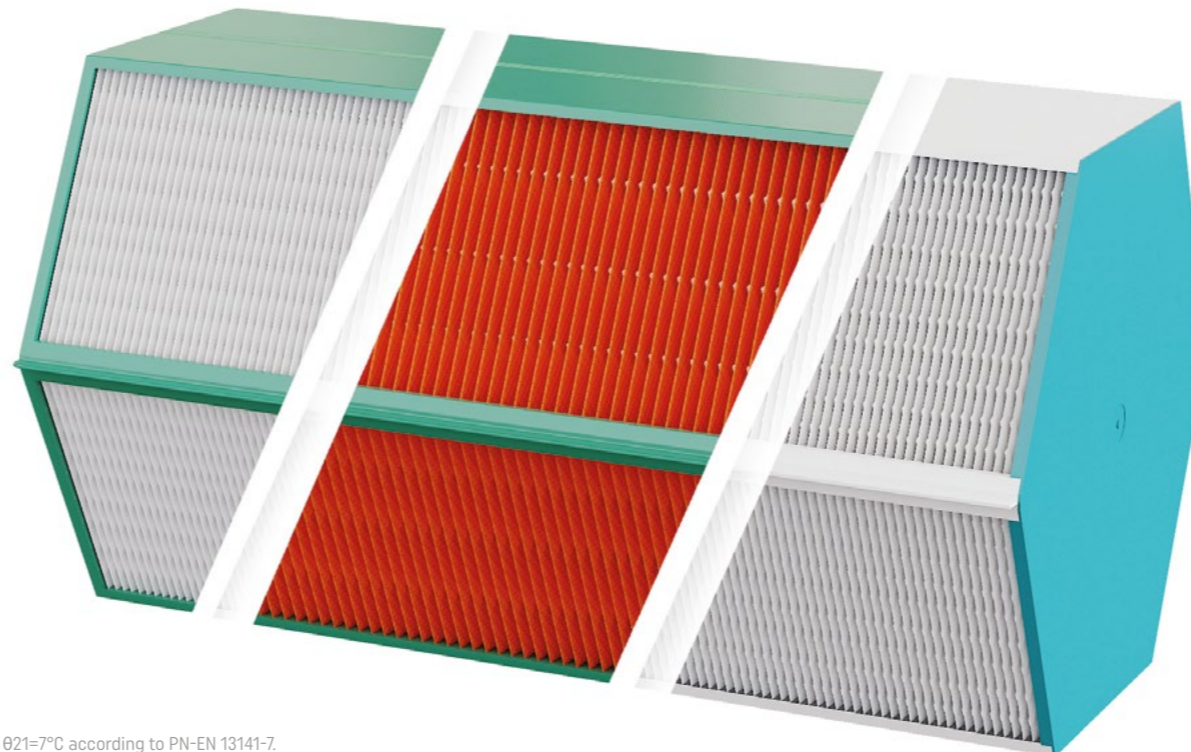
Detailed data for the VW and VS series AHUs can be found on pages 14 and 18.

\* Test report no. 140/NN/2017 - Measurement of the temperature efficiency of the air handling units. Test at temperatures  $\theta_{11}=20^{\circ}\text{C}$ ,  $\theta_{21}=7^{\circ}\text{C}$  according to PN-EN 13141-7.



## Automatic summer bypass

Bypass is an additional duct built into the air handling unit that allows the supply air stream to avoid the heat recovery system. In the transitional and winter period, the air handling unit allows for the recovery of heat from the air removed from the rooms. In summer, when the outdoor air temperature in the evening and night hours is lower than indoor air, the heat recovery system may be bypassed. As a result, the air temperature in the house will be lowered without the use of air conditioning system.



## What is a hybrid exchanger?

The supply air in winter contains a negligible amount of water vapor - therefore when heated on the heat exchanger it feels „dry“.

In the case of small moisture gains (few household members, no food preparation), the low humidity will persist and may lead to dust to rise and irritation of the throat and eyes.

For this reason, a hybrid exchanger was developed, which is a compromise between two classic models - enthalpy and temperature.

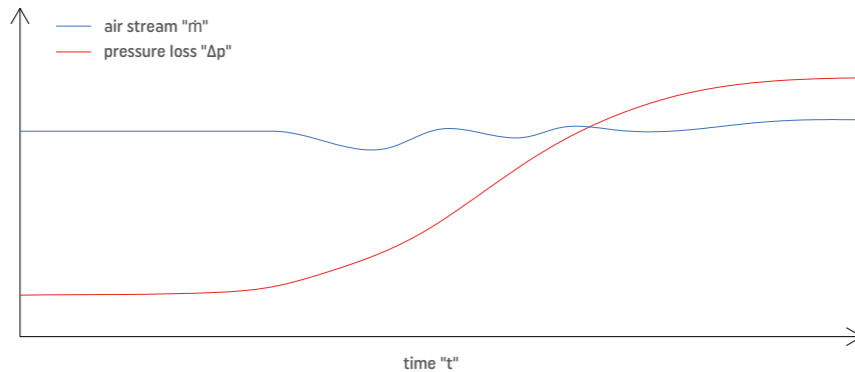
Compared to the enthalpy exchanger, the hybrid exchanger is characterized by lower moisture recovery and higher temperature efficiency.

# COMFORT THROUGHOUT TIME



**Constant air flow rate regardless of the degree of filter contamination.**

The fans used in the VW series AHUs are characterized by a built-in Constant Flow function, thanks to which the flow set by the user is maintained despite changes in pressure resistance in the installation caused by e.g. contamination of the air filters. The equalization of the supply and exhaust air streams ensures the highest efficiency of heat recovery. Adjusting the air stream is based on the expected value - there is no need to determine the operating point on the basis of calculations for the ventilation system made.



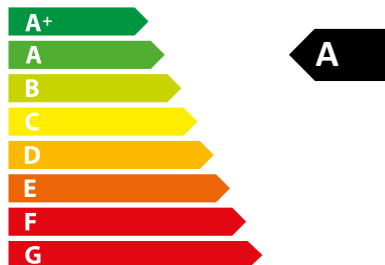
**High energy efficiency class of the AHU**

Fans with EC motors have been matched to the air streams present in each of the air handling units, thanks to which their operating point is in the area of high efficiency. Combining them with a dedicated controller and various available sensors allowed to achieve the energy efficiency class for individual models at level A.



**Efficient fans with EC motor**

The used fans with EC motors are characterized by high efficiency and low energy consumption in the entire operating range. The modern, compact design allows to limit heat generation, reduce engine vibrations and extend the service life of the device. The 0-10 V control signal enables smooth regulation of the fans.



# THE AIR QUALITY IN YOUR HOME IS THE MOST IMPORTANT TO US

Together with the Indoor and Outdoor Air Quality Department of the Lublin University of Technology, a supply air filtration system has been developed and tested, ensuring the effectiveness of air disinfection, min. 70% for three strains of bacteria (*Micrococcus luteus*, *Pseudomonas fluorescens*, *Bacillus subtilis*)\*.

Quick control and replacement of filters in VW series AHUs is possible after removing the plugs in the side cover of the device.

Filter class	Efficiency range	Examples of fine dust
ISO ePM1	ePM1, min ≥ 50%	The finest dust less than 1 μm in diameter: viruses, bacteria, nanoparticles, soot.
ISO ePM2,5	ePM2,5 min ≥ 50%	Fine dust less than 2.5 μm in diameter: bacteria, fungal and mold spores, pollens, toner dust.
ISO ePM10	ePM10 ≥ 50%	Fine dust less than 10 μm in diameter: pollens, stone dust, dust from field cultivation.
ISO coarse	ePM10 < 50%	Visible coarse-grained dust: sand, hair and leaves, lint, seedlings floating in the air, etc.



**Double filtration of supply air**

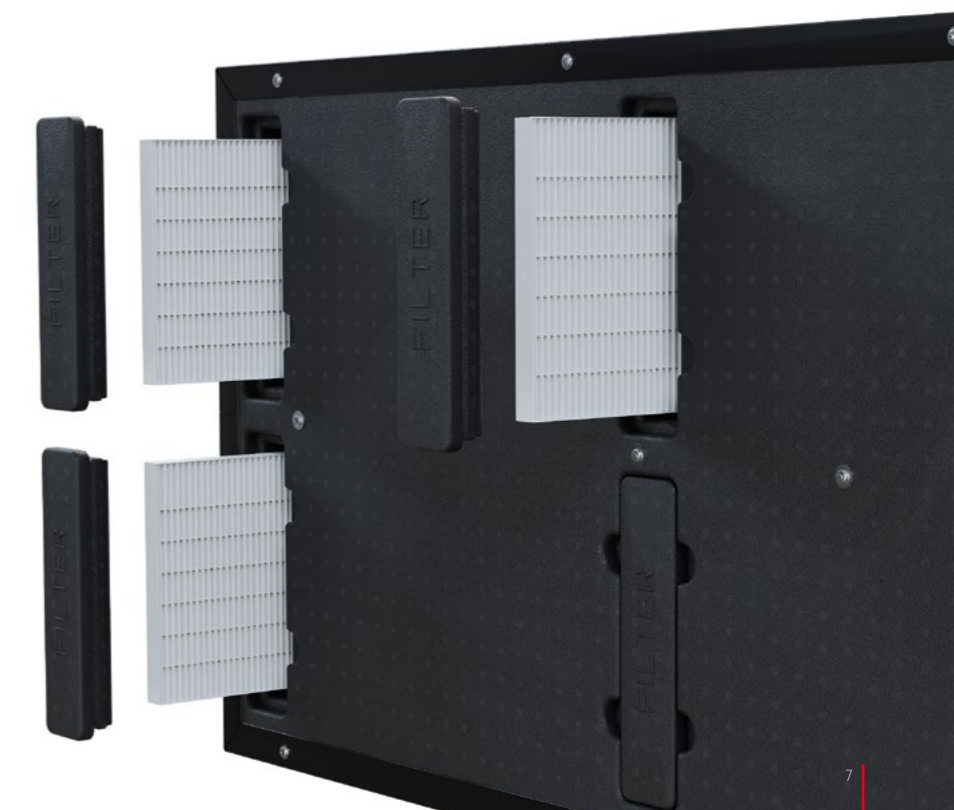
- ePM10 pre-filter (60%)
- ePM1 anti-smog filter (55%)



**Air disinfection**

- using the built-in UV lamp.

\* Test report no. 140/NN/2017 - Measurement of the disinfection efficiency of UV modules.



# SAFE WORK ALL YEAR ROUND



## Innovative anti-freeze system

The water vapor contained in the exhausted air cools down and condenses on the fins of the heat exchanger. If the exhausted air temperature drops below 0°C, the condensate freezes between the fins. Temperature exchangers are particularly susceptible to freezing - in the case of other types, due to the recovery of moisture, the amount of condensate is much smaller.

The anti-freeze system developed for the **freshAIR+** air handling units combines automatic heating of the heat exchanger, initial heating of the air stream and (in the case of very low outside temperatures) modification of the set air streams.

## Why is the anti-freeze system so important?

Research on the legitimacy of using anti-freeze systems has confirmed the freezing of temperature heat exchangers at the outdoor air temperature from 0°C.

The freezing of the condensate on the exchanger fins causes blockage of the space through which the air flows, limiting the air flow, which in turn causes a reduction in heat recovery.

Thanks to the use of a specially developed anti-freeze system in Verano air handling units, the heat exchanger does not freeze.

The photo on the right shows a frozen heat exchanger - an AHU test without an anti-freeze system.



## PTC pre-heater

The applied PTC pre-heater is characterized by a stable, modular structure, low flow resistance and uniform heating of the air stream. The temperature sensor used allows to reduce energy consumption and protects against overheating of the air handling unit.



# WE CARE ABOUT YOUR THERMAL COMFORT



## Possibility to install a water heater or cooler\*

For the sake of thermal comfort of users, each of the VW series AHUs can be equipped with a secondary heater or a cooler with a condensate pump.

The choice of the variant depends on the design of the ventilation system and the investor's expectations.

The secondary heater can be powered by the medium of the central heating installation. The installation of chilled water is required to supply the cooler.

## Built-in secondary heater

It allows you to increase the temperature of the supply air without taking up additional space for the installation.

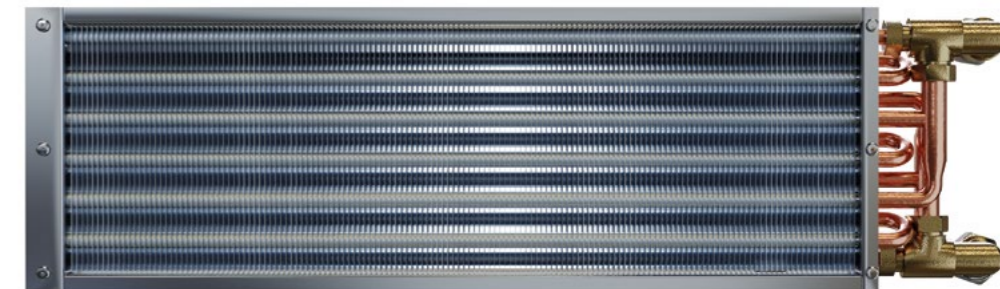
Additional equipment is installed inside the AHU casing - there is no need to prepare a special section of the installation, therefore the decision to purchase additional equipment may be made at the stage of system exploitation.

Connection to the central heating system or chilled water is carried out by means of flexible hoses ended with a half-union.

The automation system allows you to connect ON-OFF, 3-position or controlled by the 0-10V signal actuators.

Additionally, it is possible to actuate a circulation pump or a central heating boiler or chilled water unit with a permission signal from the AHU controller.

Dedicated 3-port or 4-port balancing valves guarantee the assumed designed flow of the heating medium or chilled water.



\* The VS AHU can only be equipped with a secondary heater. If cooling is required, you can use a duct water cooler available in the offer.

# SILENT AIR HANDLING UNIT IN A MODERN CASING



## Casing made of EPP

The AHUs casings are made of extruded polypropylene, which is the structure of the individual components of the AHU. The production process is subject to strict requirements and is carried out in accordance with the ISO IATF 16949 and ISO 9001 quality management system and the ISO 14001 environmental management system. The material from which the casings are made is 100% recyclable.



## Light casing design

Matching parts, made with the use of injection molds, guarantee tightness unattainable by classic sheet metal casings, moreover, the structure of the material ensures low weight of the device. It is also possible to make a AHU with a casing completely covered with a steel sheet.



## Excellent thermal and acoustic insulation of the casing\*

The use of 40 mm thick extruded polypropylene provides excellent thermal and acoustic insulation of the device.



# AIR HANDLING UNIT CONTROL HAS NEVER BEEN SO EASY



## Remote control via computer or smartphone

The controller has been designed especially for VERANO **freshAIR+** air handling units. It clearly provides access to all functions and settings of AHUs. It enables remote control of the AHU operation using a web application available in a web browser or an application for tablets and smartphones available for Android and iOS systems. The controller also allows to record data related to the operation of the air handling unit in real time. The data is used during service inspections and allows for quick detection of irregularities in the operation of the device. The controller is available with a built-in monochrome panel with buttons or with a wall-mounted color touch panel.



## Possibility to connect CO<sub>2</sub>, RH sensors

Apart from temperature sensors, the controller can also be connected to a relative humidity sensor, a CO<sub>2</sub> concentration sensor, an air quality sensor PM10 and PM2.5.



## Cooperation of the controller with the GHE

It is possible to control the glycol circulation pump of the ground heat exchanger, which supplies the medium heated in the ground to the finned heat exchanger located on the intake duct.



freshAIR+



TEMPERATURE  
EFFICIENCY  
UP TO 95%



## AIR HANDLING UNITS. VW SERIE



Wireless control



Automatic bypass



Temperature and moisture recovery\*



Built-in secondary heater or cooler\*\*



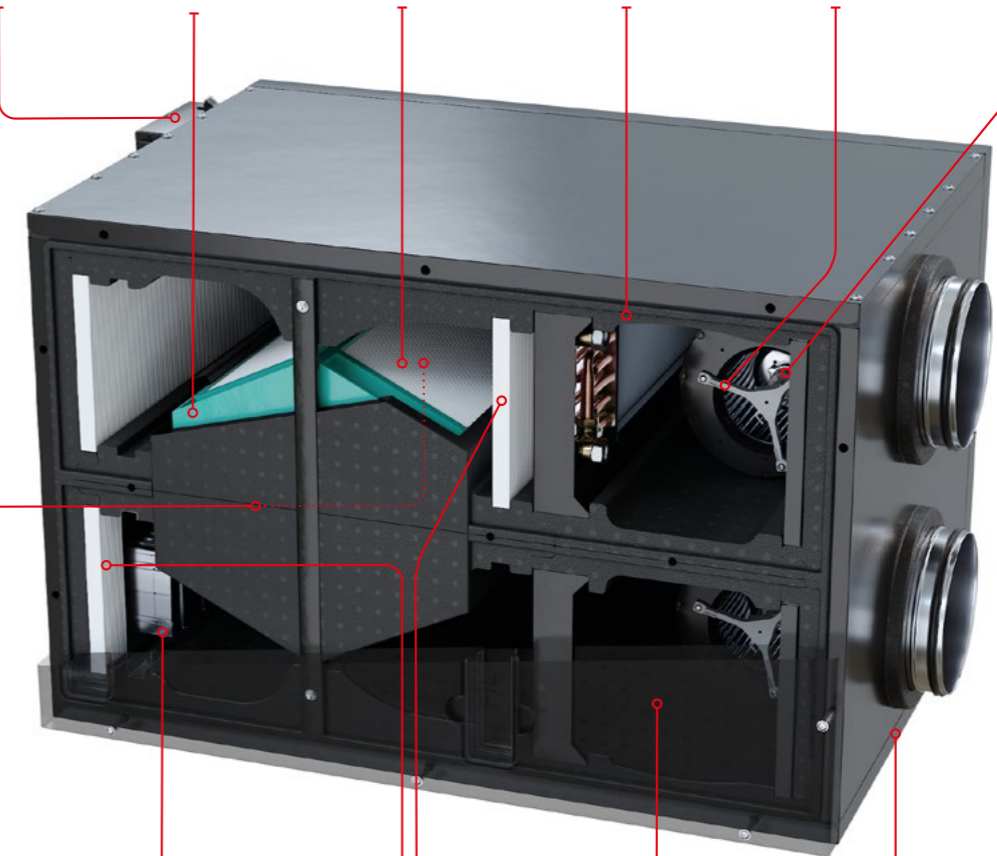
Energy-saving EC fans



Constant Flow



Removable exchanger



Built-in pre-heater



Double filtration of supply air



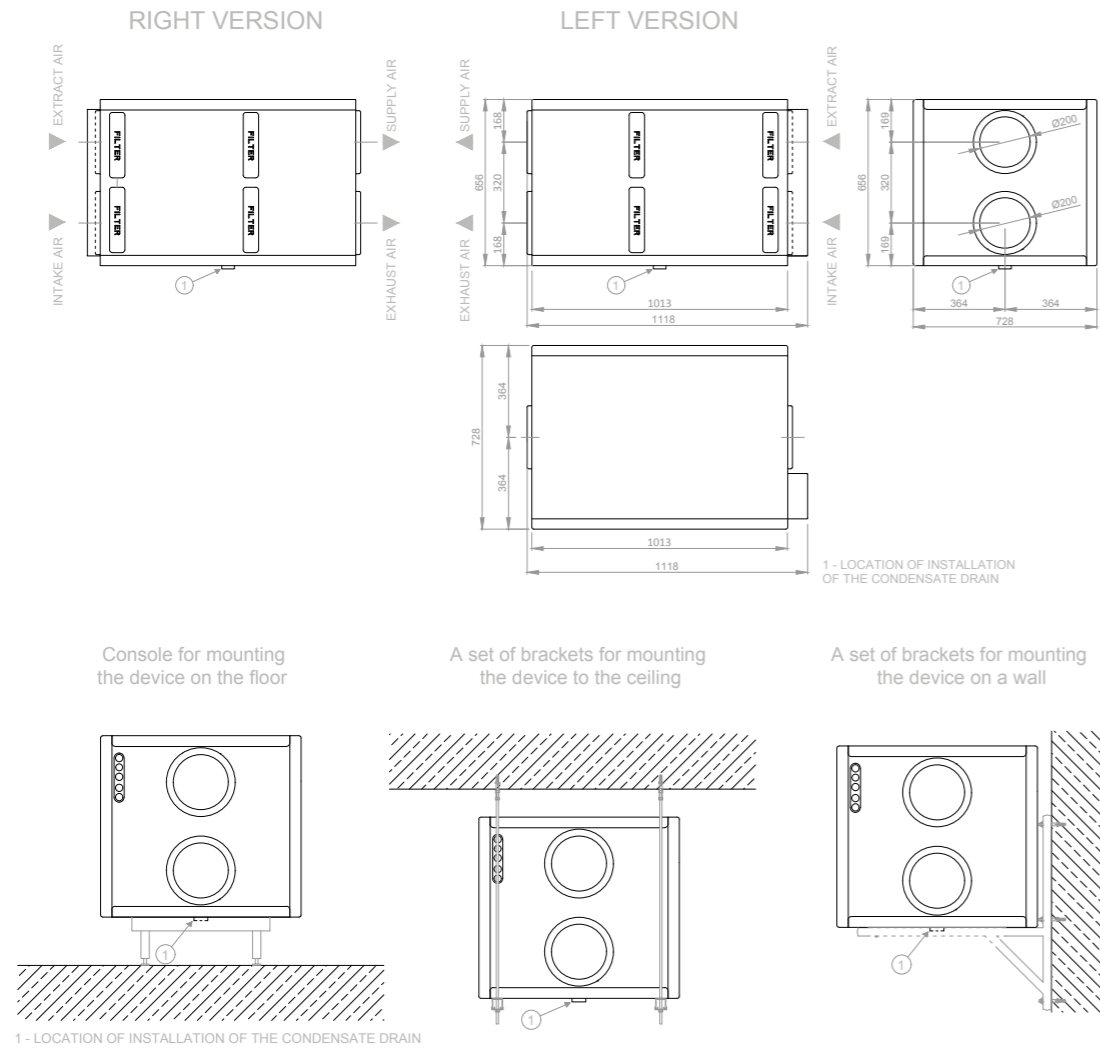
Modern casing made of EPP



Light construction

\* It does not apply to the VWT air handling unit.  
\*\* Available in selected models of the air handling units.

# DIMENSIONS AND INSTALLATION OF FRESHAIR+ AIR HANDLING UNITS OF VW SERIE



For each installation system, there must be a place under the AHU for the condensate drainage system. When using an angular dry siphon (accessory), the minimum height is 150 mm and it is a siphon recommended for installation if a standing console is selected. Detailed information on the installation method can be found in the installation manual for the AHU.

Name	freshAIR+ VWT 450	freshAIR+ VVE 330	freshAIR+ VWH 450	Unit
Exchanger type	TEMPERATURE	ENTHALPY	HYBRID	
<b>Air stream</b>				
• maximum	450	330	450	[m³/h]
• nominal	315	230	315	[m³/h]
• minimum	90	90	90	[m³/h]
Static pressure (for nominal air stream)	200	300	250	[Pa]
<b>Temperature efficiency of heat recovery</b>				
• for nominal air stream	89	86	81	[%]
• for minimum air stream	93	89	92	[%]
<b>Energy efficiency class</b>				
• timed control	A	A	A	
• local control according to demand	A	A	A	
<b>Power consumption</b>				
• for maximum air stream at the static pressure of 100 Pa	248	119	233	[W]
• for nominal air stream at the static pressure of 50 Pa	114	71	110	[W]
Maximum sound power level (LWA)	55	52	55	[dB(A)]
Built-in PTC electric heater		2,0		[kW]
Supply voltage		230		[V]
Width		1050		[mm]
Height		657		[mm]
Depth		727		[mm]
Diameter of connection slots		200		[mm]
Diameter of condensate connection		GZ 1 1/4"		[mm]
Filter class		ePM10 (60%) ePM1 (55%)		
Filter dimensions		ePM10 (60%) – 220x646x21 mm ePM1 (55%) – 225x646x21 mm		[mm]



# WATER HEATERS AND COOLERS

VW series AHUs can be factory-fitted with a built-in secondary water heater (models marked LH and RH) or a secondary water cooler (models marked LC and RC).

The individual operating parameters are presented below.

## Water heater

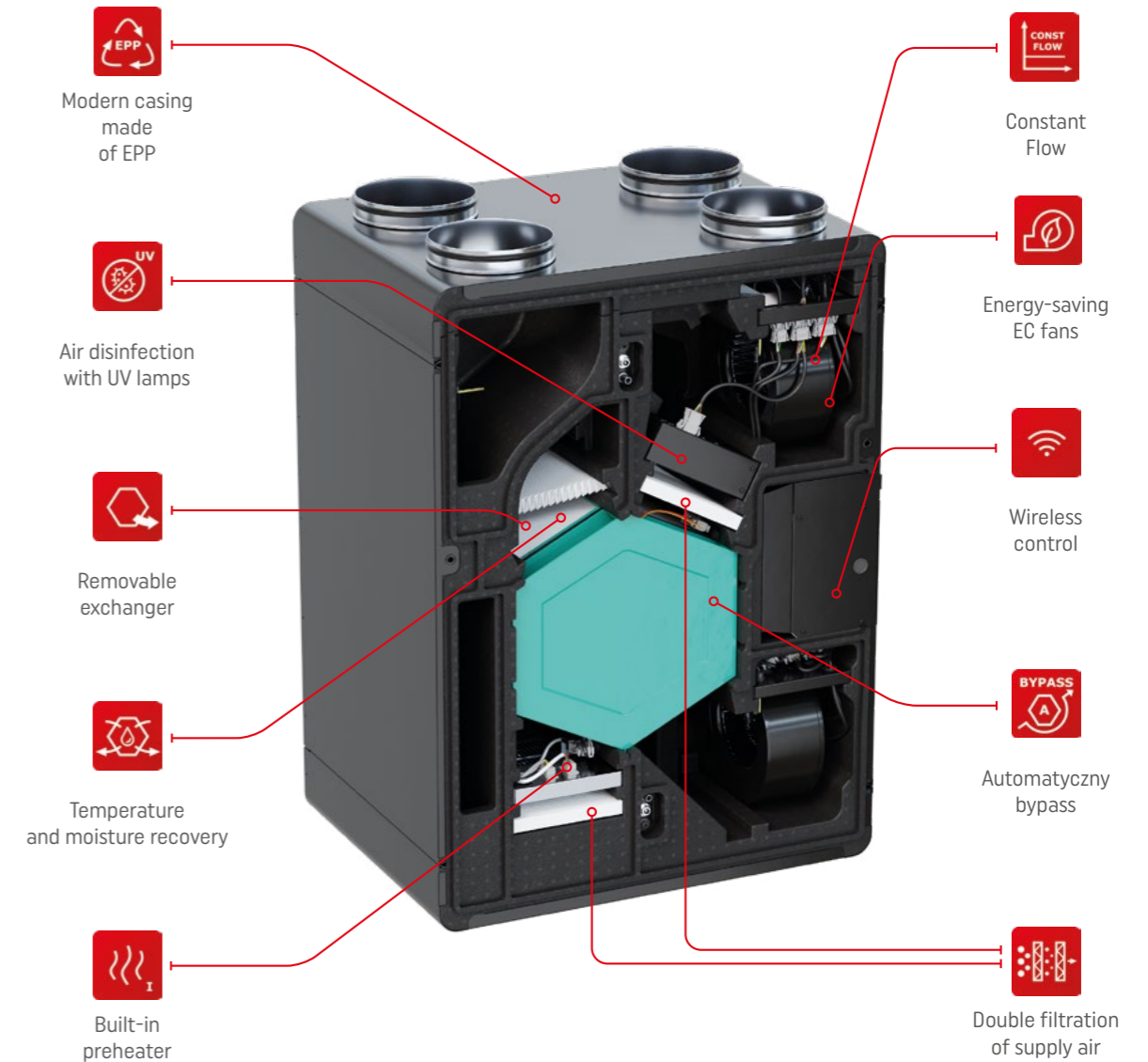
AIR STREAM	INTAKE AIR TEMPERATURE	MEDIUM TEMPERATURE											
		SUPPLY/RETURN: 75/65°C				SUPPLY/RETURN: 55/45°C				SUPPLY/RETURN: 35/30°C			
V	t <sub>p1</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>
[m³/h]	[°C]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]
450	8	45,84	<b>3,87</b>	338	4,58	32,38	<b>2,48</b>	216	2,23	21,97	<b>1,42</b>	246	3,04
	12	47,27	<b>3,62</b>	316	4,06	33,56	<b>2,20</b>	192	1,80	23,37	<b>1,16</b>	201	2,13
	16	48,68	<b>3,37</b>	294	3,57	35,23	<b>1,98</b>	172	1,49	24,79	<b>0,90</b>	156	1,37
315	8	41,55	<b>5,12</b>	450	7,66	29,63	<b>3,30</b>	288	3,7	20,46	<b>1,90</b>	329	5,08
	12	43,35	<b>4,80</b>	422	6,82	31,28	<b>2,95</b>	257	3,03	22,13	<b>1,55</b>	268	3,55
	16	44,95	<b>4,45</b>	391	5,95	32,92	<b>2,60</b>	227	2,42	23,81	<b>1,20</b>	208	2,26

## Water cooler

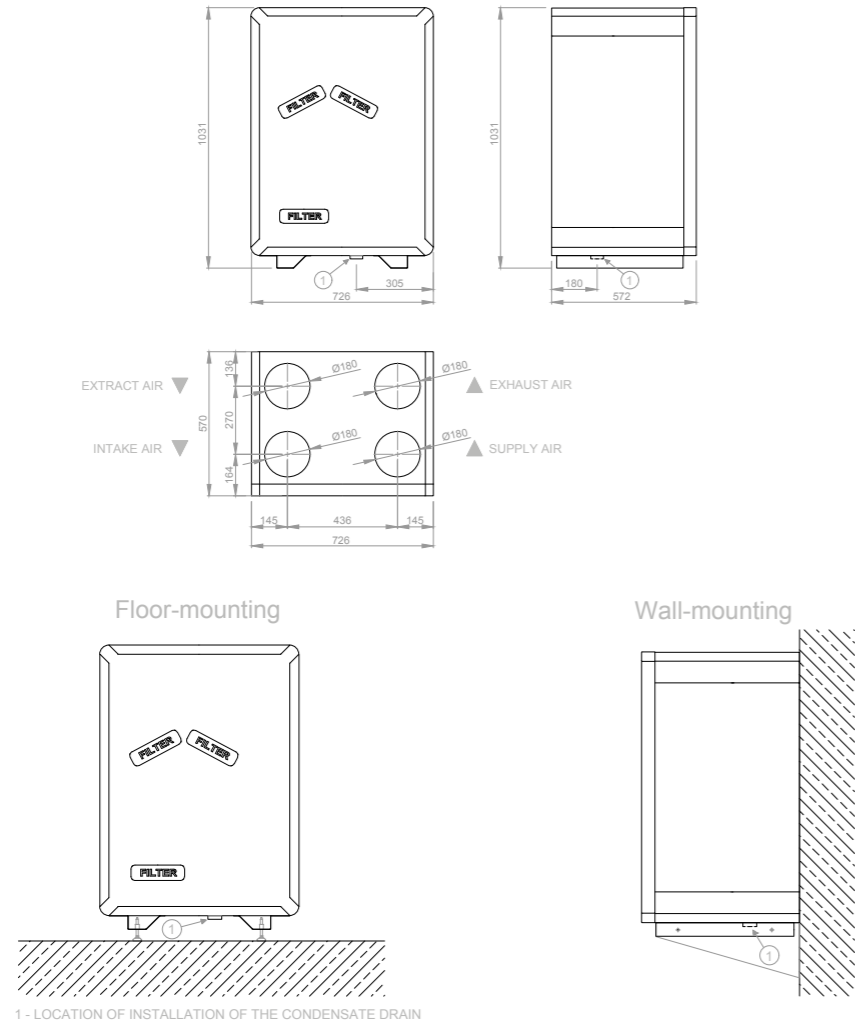
AIR STREAM	INTAKE AIR TEMPERATURE	MEDIUM TEMPERATURE											
		SUPPLY/RETURN: 7/12°C				SUPPLY/RETURN: 10/15°C				SUPPLY/RETURN: 17/19°C			
V	t <sub>p1</sub>	t <sub>p2</sub>	P <sub>ch</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>ch</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>ch</sub>	w	P <sub>w</sub>
[m³/h]	[°C]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]
450	28	19,86	<b>1,02</b>	175	1,95	21,60	<b>0,66</b>	113	0,91	22,45	<b>0,57</b>	245	3,3
	32	22,34	<b>1,56</b>	268	4,07	23,34	<b>1,22</b>	210	2,61	24,01	<b>0,87</b>	375	6,93
	36	25,05	<b>2,11</b>	362	6,90	26,04	<b>1,80</b>	309	5,13	27,05	<b>1,40</b>	603	16,08
315	28	20,65	<b>1,40</b>	240	3,38	21,73	<b>1,00</b>	172	1,85	23,07	<b>0,76</b>	327	5,46
	32	23,54	<b>2,05</b>	352	6,56	24,27	<b>1,64</b>	282	4,36	24,90	<b>1,17</b>	495	11,34
	36	26,48	<b>2,75</b>	472	10,99	27,35	<b>2,34</b>	402	8,12	28,12	<b>1,84</b>	792	26,20

t<sub>p1</sub> - air temperature before water heater/cooler  
 t<sub>p2</sub> - air temperature after water heater/cooler  
 P<sub>n</sub> - heating output  
 P<sub>ch</sub> - cooling output  
 w - medium flow  
 P<sub>w</sub> - pressure loss

# AIR HANDLING UNITS. VS SERIE



# DIMENSIONS AND INSTALLATION OF FRESHAIR+ AIR HANDLING UNITS OF VS SERIE



For each installation system, there must be a place under the AHU for the condensate drainage system. When using an angular dry siphon (accessory), the minimum height is 150 mm and it is a siphon recommended for installation if a floor-mounting is selected. Detailed information on the installation method can be found in the installation manual for the AHU.

Name	freshAIR+ VST 400	freshAIR+ VSE 250	freshAIR+ VSH 400	Unit
Exchanger type	TEMPERATURE	ENTHALPY	HYBRID	
<b>Air stream</b>				
• maximum	400	250	400	[m³/h]
• nominal	280	175	280	[m³/h]
• minimum	90	90	90	[m³/h]
Static pressure (for nominal air stream)	150	250	200	[Pa]
<b>Temperature efficiency of heat recovery</b>				
• for nominal air stream	88	80	85	[%]
• for minimum air stream	93	86	92	[%]
<b>Energy efficiency class</b>				
• timed control	A	A	A	
• local control according to demand	A	A	A	
<b>Power consumption</b>				
• for maximum air stream at the static pressure of 100 Pa	271	81	253	[W]
• for nominal air stream at the static pressure of 50 Pa	122	52	115	[W]
Maximum sound power level (LWA)	52	49	52	[dB(A)]
Built-in PTC electric heater		1,5		[kW]
Supply voltage		230		[V]
Width		726		[mm]
Height		1031		[mm]
Depth		572		[mm]
Diameter of connection slots		180		[mm]
Diameter of condensate connection		GZ 1 ¼"		[mm]
Filter class		ePM10 (60%) ePM1 (55%)		
Filter dimensions		ePM10 (60%) – 175x480x18 ePM1 (55%) – 175x480x18		[mm]

# WATER HEATER

The VS series AHU can be factory equipped with a built-in secondary water heater (models marked H).  
The individual operating parameters are presented below.

## Water heater

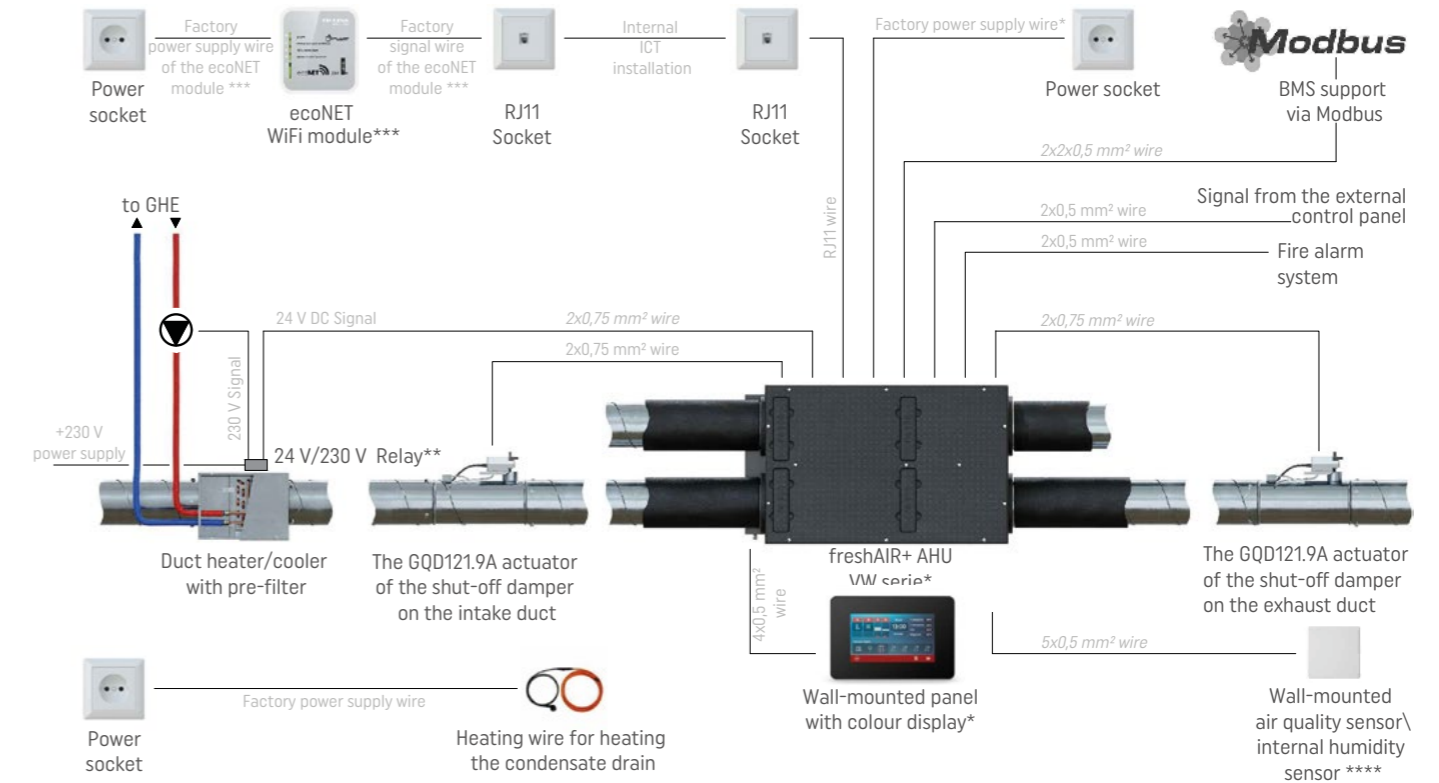
AIR STREAM	INTAKE AIR TEMPERATURE	MEDIUM TEMPERATURE											
		SUPPLY/RETURN: 75/65°C				SUPPLY/RETURN: 55/45°C				SUPPLY/RETURN: 35/30°C			
V	t <sub>p1</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>	t <sub>p2</sub>	P <sub>n</sub>	w	P <sub>w</sub>
[m³/h]	[°C]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]	[°C]	[kW]	[L/h]	[kPa]
250	8	41,15	<b>2,81</b>	247	11,81	29,36	<b>1,81</b>	158	5,72	20,39	<b>1,05</b>	182	7,98
	12	42,69	<b>2,61</b>	229	10,34	31,05	<b>1,62</b>	141	4,70	22,00	<b>0,85</b>	147	5,50
	16	44,57	<b>2,44</b>	214	9,17	32,75	<b>1,43</b>	125	3,77	23,73	<b>0,66</b>	114	3,53
400	8	36,32	<b>3,84</b>	337	20,75	26,22	<b>2,47</b>	215	9,93	18,55	<b>1,43</b>	248	13,78
	12	38,38	<b>3,59</b>	315	18,37	28,25	<b>2,21</b>	193	8,15	20,60	<b>1,17</b>	203	9,66
	16	40,45	<b>3,34</b>	294	16,13	30,35	<b>1,96</b>	171	6,58	22,66	<b>0,91</b>	158	6,20

t<sub>p1</sub> - air temperature before water heater/cooler  
t<sub>p2</sub> - air temperature after water heater/cooler  
P<sub>n</sub> - heating output  
w - medium flow  
P<sub>w</sub> - pressure loss

# WIRING DIAGRAM

## LOCAL CONTROL ACCORDING TO DEMAND (DEMAND CONTROL VENTILATION)

Possibility to connect devices to the air handling unit.



\*Standard scope of delivery for the air handling unit. The power supply socket of the air handling unit should be made on a separate electrical circuit equipped with a residual current circuit breaker min. 16A. The maximum length of the given wires is 50 m. The humidity sensor is built into the AHU.

\*\*The controller controls the operation of the GHE pump via a 24 V/230 V relay located in the electrical box placed on the duct pre-heater.

\*\*\*WiFi module included in the standard scope of delivery for the AHU.

\*\*\*\*Wall-mounted air quality sensor only in DCV version. Internal air humidity sensor as standard.

# GROUP OF PRODUCTS

## Compact air handling units

freshAIR+



AHUs of VC serie



AHUs of VS serie

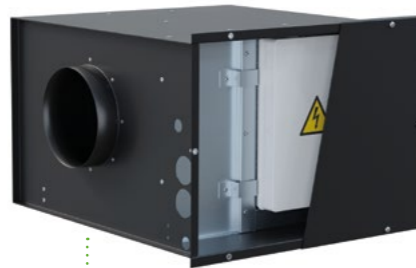


AHUs of VW serie

## Air heaters and coolers



Duct water heater



Electric duct heater



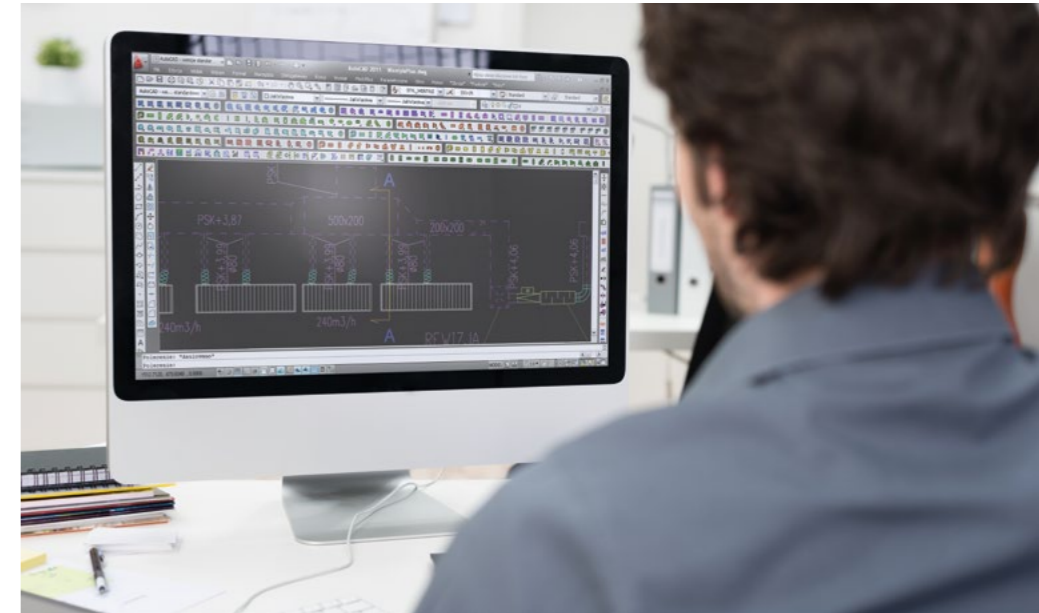
Duct water cooler

# WENTYLE PROGRAM

VERANO

**WENTYLE** is a free application dedicated to AutoCAD/IntelliCAD supporting drawing and calculating ventilation installations. It can be downloaded from [www.tomicad.pl/en](http://www.tomicad.pl/en). The application includes databases of heating and cooling units (CVK2P, CVK4P) and fan assisted trench heaters (VKN5P) with fresh air supply, as well as a database of VERANO air handling units.

**WENTYLE** supports the drawing of 2D ventilation installations based on the system of circular ducts as well as rectangular ducts and fittings. It enables convenient construction of installation and easy changes to it. Finally, it creates an automatic list of elements used in the project. It is also possible to automatically calculate the pressure drops of the created installation or its part.



- freshAIR+ products currently available in the program:

VKN5P fan assisted trench heaters with fresh air supply



CVK2P/CVK4P heating and cooling units with fresh air supply



AHUs of VW serie



- freshAIR+ products soon available in the program:

AHUs of VC serie



AHUs of VS serie



Duct water heaters and coolers



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G L O B A L



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